

SAN DIEGO REGIONAL
WATER QUALITY
CONTROL BOARD

ATTACHMENT 2
TO
TENTATIVE ORDER No
29-2002-0014

2002 JAN 10 P 2:19

**HABITAT RESTORATION AND MONITORING PLAN
FOR THE CITY OF CARLSBAD BRIDGE &
THOROUGHFARE DISTRICT NO. 4, THE CALAVERA
HILLS PROJECT, AND THE DETENTION BASINS
PROJECT IN
CARLSBAD, CALIFORNIA**

Prepared for

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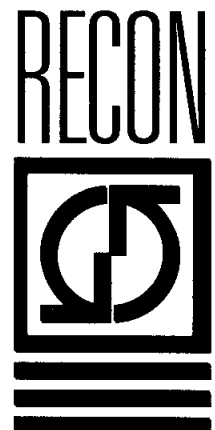


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ATTACHMENT

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Introduction

This habitat restoration and monitoring plan provides an implementation strategy, maintenance regime, and monitoring goals for the ultimate creation of 10.7 acres of southern willow scrub as mitigation for impacts to 3.7 acres jurisdictional waters as part of the Calavera Hills Master Plan Phase II and Bridge and Thoroughfare District No. 4 projects.

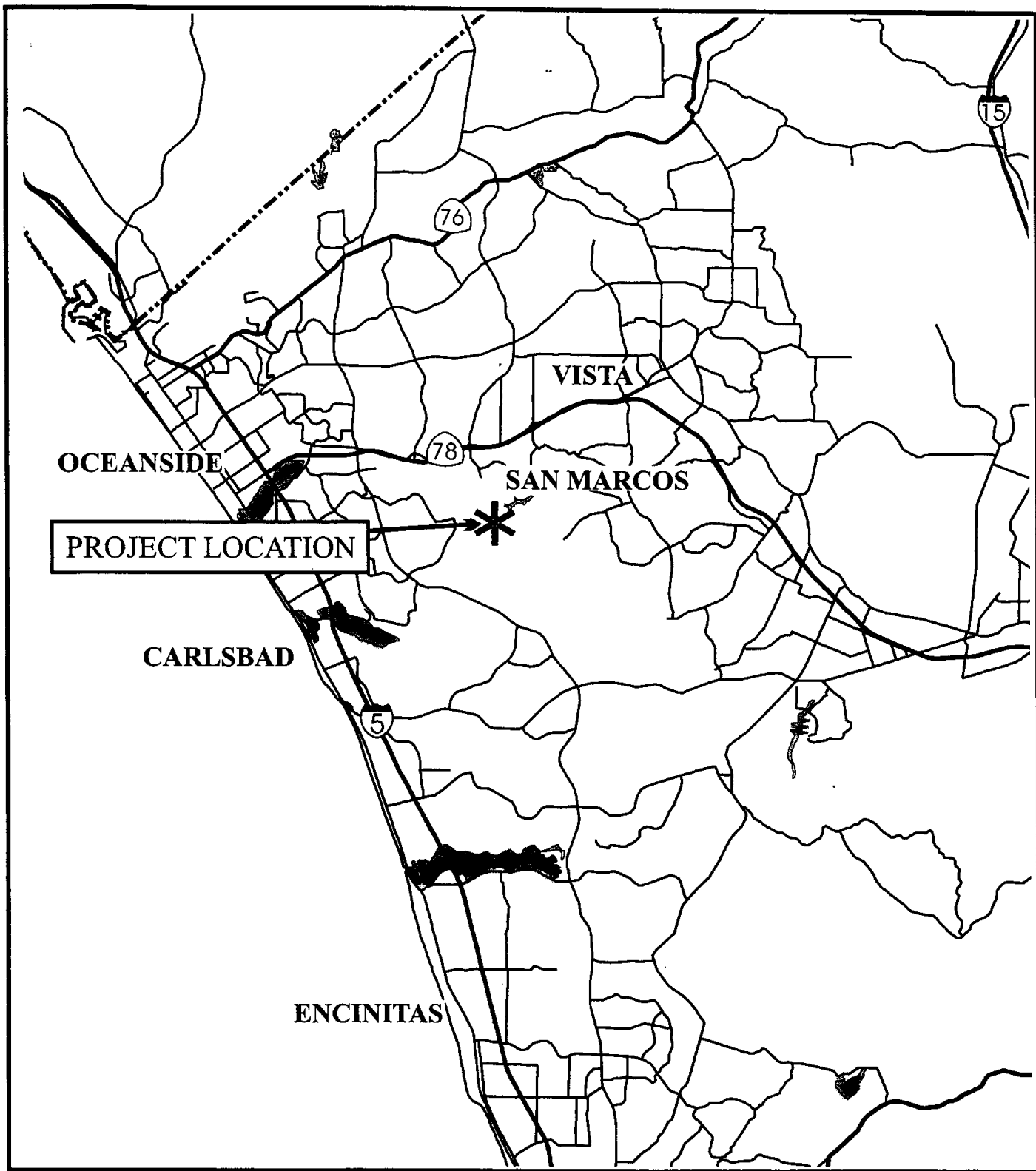
The project site is located in the northeast quadrant of the city of Carlsbad (Figures 1 and 2) and consists of three components: Calavera Hills Master Plan Phase II area, Bridge and Thoroughfare District No. 4, and two proposed detention basins. The Calavera Hills Master Plan area is bounded by State Route 78 (SR-78) in the north with the southern boundary being an east-west line approximately one-half of a mile north of the Rancho Carlsbad Mobile Home Park. Current land use in the area is predominantly agricultural with remnant southern mixed/chamise chaparral and Diegan coastal sage scrub. Agricultural development has reduced and confined the remaining riparian vegetation to a narrow strip along Calavera Creek.

The project will temporarily impact 0.4 acre and directly impact 3.3 acres of jurisdictional waters including wetlands. The mitigation ratios required for each vegetation type are summarized in Table 1. Of the 3.7 acres of impacted wetland, 1.8 acres are occupied by the federally listed least Bell's vireo. All impacts to wetlands are considered significant and will be mitigated by the creation of 10.7 acres of southern willow scrub and least Bell's vireo habitat on Calavera and Little Encinas Creeks.

TABLE 1
WETLAND PLANT COMMUNITY MITIGATION

Plant Community	Project Impacts (acres)	Mitigation Ratio	Required On-Site Mitigation (acres)
Riparian woodland*	2.17	3:1	6.5
Riparian scrub*	0.55	3:1	1.7
Riparian forest	0	3:1	0
Cismontane alkali marsh	0.77	3:1	2.3
Non-wetland jurisdictional waters	0.21	1:1	0.2
TOTAL	3.7		10.7

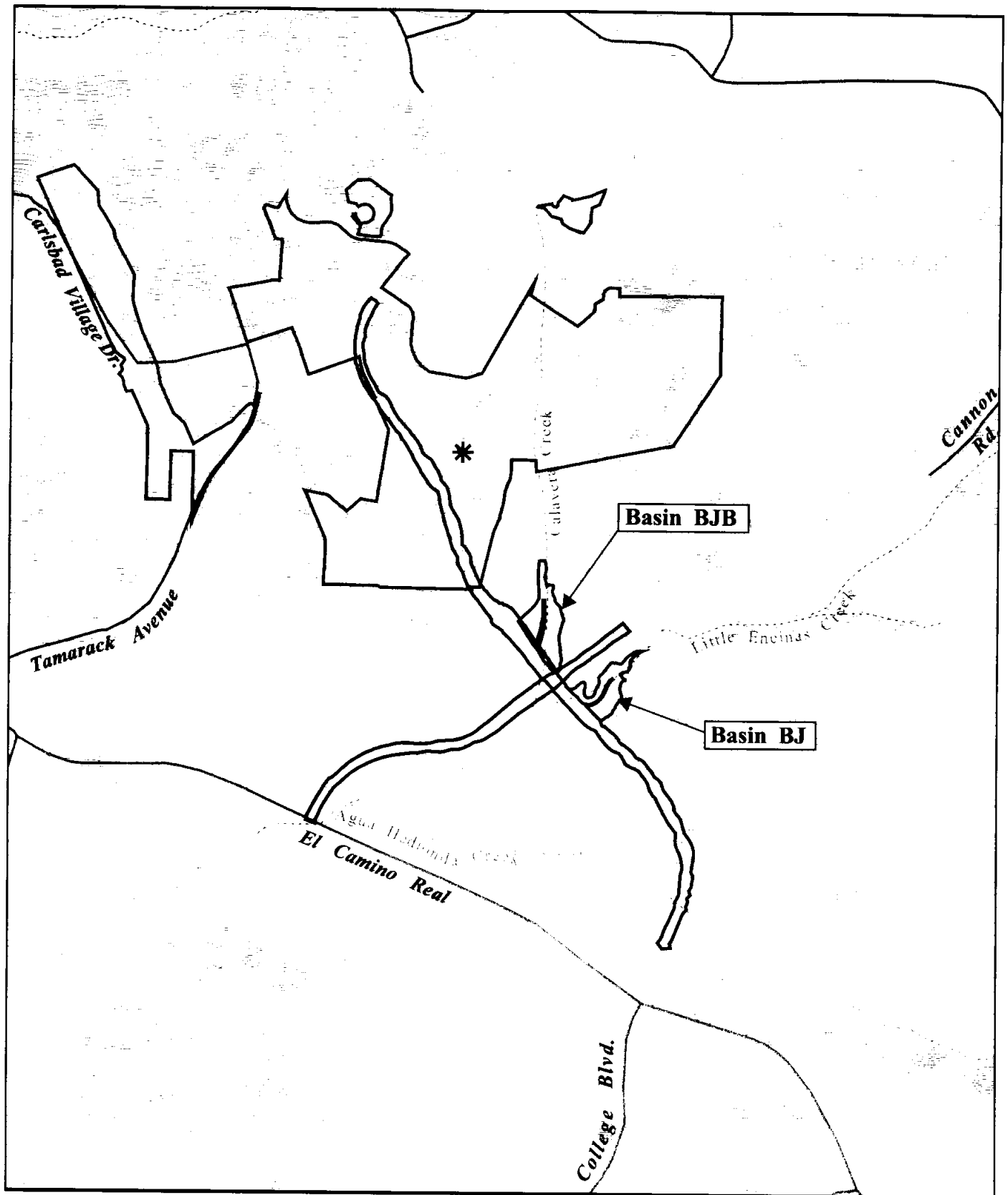
*1.5 acres of riparian woodland and 0.3 acre of riparian scrub to be impacted are occupied by the least Bell's vireo.



0 MILES 2.2 4.4

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FIGURE 1
Regional Location of the Project



0 Feet 2000

- * Man-made pond
- Master Plan Phase II
- Bridge and Thoroughfare District
- Detention basins

FIGURE 2
Project Vicinity

Mitigation will be carried out on-site by creating restoration areas along Calavera and Little Encinas Creeks (Figure 3). The northernmost mitigation site on Calavera Creek will widen the existing Calavera Creek channel to create 7.4 acres of additional wetland. The mitigation site on Little Encinas Creek will create 3.3 acres of wetlands within the “BJ” detention basin.

In all restoration areas the existing non-native vegetation will be replaced with southern willow scrub. Where appropriate, the southern willow scrub vegetation will be augmented with riparian forest, riparian woodland, and alkali marsh species. These mitigation sites will add to and enhance the current riparian mosaic that supports least Bell’s vireo along Calavera Creek.

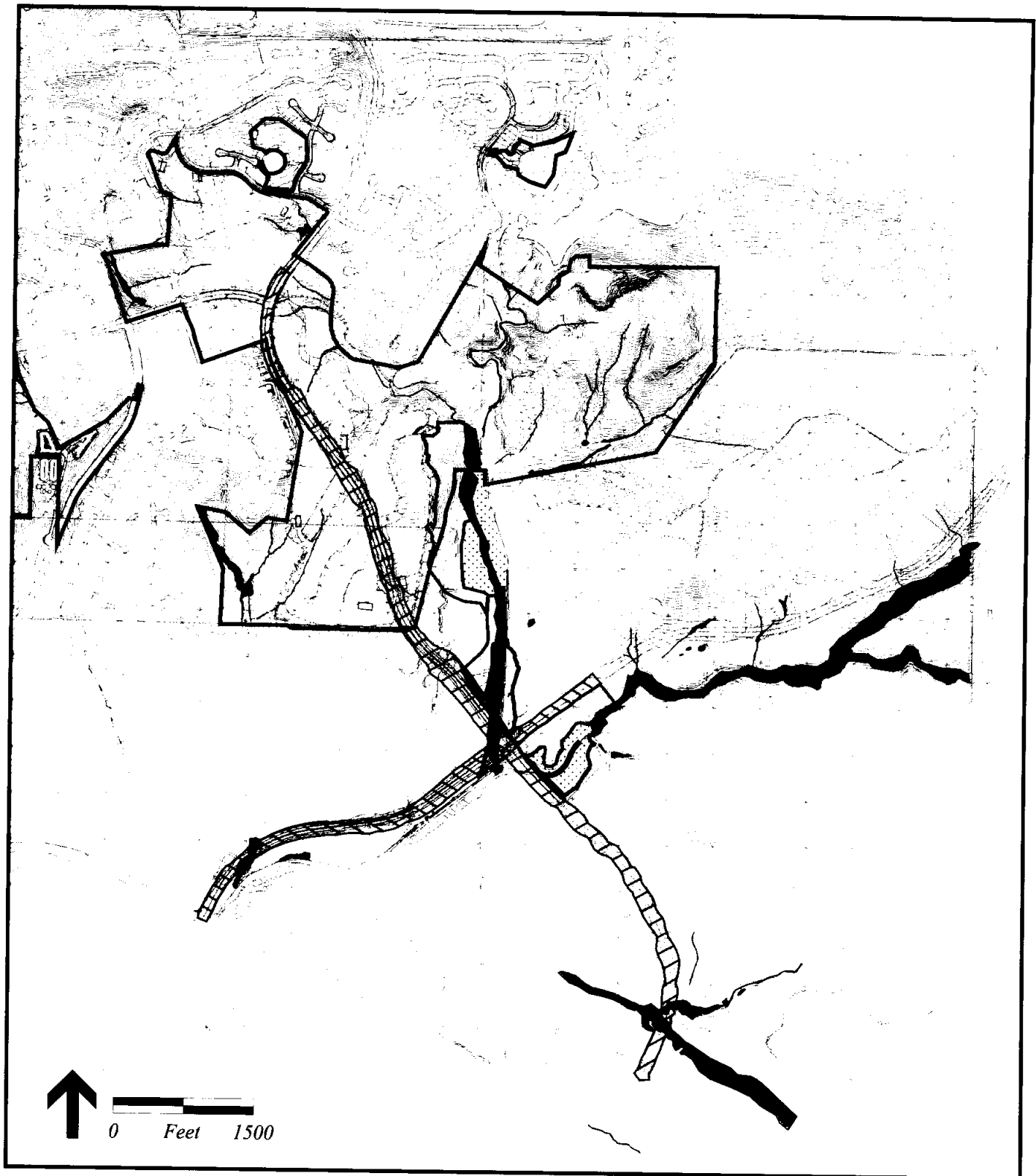
This habitat restoration and monitoring plan provides guidelines, design criteria, and construction methods through which a functioning southern willow scrub wetland community can be created. Because the construction of the roadway links is expected to be phased, installation of mitigation may also be phased.

Habitat Types Proposed to Be Impacted

The extension of College Boulevard and Cannon Road and the Phase II Master Plan would temporarily and permanently impact a total of 3.7 acres of wetland, including riparian scrub, woodland and forest vegetation, seasonal and perennial cismontane alkali marsh, and non-wetland waters. A wetland functional analysis was prepared for the site to rate the wetland functions and values of the existing wetlands to be impacted and the anticipated wetland functions and values to be gained after implementation of the mitigation effort (Attachment 1).

The overall habitat value of the mixed riparian vegetation along the major creeks is moderate to high. Surveys indicate vegetation along Calavera Creek supports several individuals of the federally listed least Bell’s vireo. The vegetation where the vireos were sighted is predominantly mule fat (*Baccharis salicifolia*) with a western sycamore (*Platanus racemosa*) overstory. The riparian scrub and riparian woodland vegetation communities throughout the area have been colonized by non-native species, including giant reed (*Arundo donax*), castor bean (*Ricinus communis*), and pampas grass (*Cortderia jubata*). The edges in particular have been invaded by fennel (*Foeniculum vulgare*) and mustard (*Brassica spp*) from the adjacent agricultural lands.

The cismontane alkali marsh and seasonal cismontane alkali marsh found on the site are characterized by the presence of wetland species, including spiny rush (*Juncus acutus* ssp. *leopoldii*), yerba mansa (*Anemopsis californica*), salt grass (*Distichlis spicata*), spikerush (*Eleocharis* sp.), and alkali heath (*Frankenia salina*). The seasonal marsh is generally located at the upper end of small erosional drainages on the site adjacent to Little Encinas







-  Project Boundary
-  Jurisdictional Waters
-  Location of Mitigation Site
-  Buffer

FIGURE 3
Wetland Mitigation
Site Locations

and Agua Hedionda Creeks. The cismontane alkali marsh is significant on the site because it supports spiny rush, which is a CNPS List 4 species.

Both the mixed riparian vegetation and cismontane marsh in the area are supported by water flows conveyed by the creeks and surface runoff. Agricultural uses have altered the natural hydrology on portions of the project site. Areas that historically supported drainages are now routinely disked. In many of these areas subsurface flows support disjunct patches of hydrophytic vegetation.

Responsibilities

A. Owner/Project Proponent

The owner/project proponent shall provide detailed construction drawings, phasing plans, accurate timelines, and written project specifications in conformance with this plan. The owner/project proponent shall be responsible for funding all aspects of the project including implementation, long-term maintenance, and any needed remedial actions as determined by the U.S. Fish and Wildlife Service (USFWS), California Department of Fish and Game (CDFG), U.S. Army Corps of Engineers (USACE), and City of Carlsbad. The project proponent shall implement the mitigation measures outlined in this report prior to or concurrent with the impacts.

B. Project Biologist

The project biologist will be an individual or team of individuals with a minimum of two years' experience in riparian community restoration. The project biologist will be retained during the project to perform the following tasks and be responsible for implementing the restoration plan in accordance with its specifications:

- Consult with the contractor on any activities that may be disruptive to the mitigation.
- Attend pregrading and preconstruction meetings to consult with the owner/project proponent and grading contractor and to educate the contractors on restoration goals and habitat sensitivity.
- Monitor long-term maintenance activities of the mitigation area as defined herein.
- Oversee and perform the required monitoring and reporting in accordance with the procedures established in this plan.

C. Plant Supplier

The native plant supplier may be the project biologist or a qualified native plant nursery. The plant supplier must have at least two years' experience in propagating native plants.

- The plant supplier will produce properly aged plants in one-gallon containers ready for outplanting.
- All plants will be produced from seed or cuttings collected on or adjacent to the site and inoculated with mycorrhizae.

D. Seed Supplier

The seed supplier, who may also be the project biologist, must have at least two years' experience collecting riparian seeds for restoration projects.

- Only species specified by the project biologist will be collected.
- Seed will be collected from the project site, whenever possible. The range of seed collection will be limited to within a radius of 10 miles of Calavera Creek.
- The seed supplier must guarantee the purity of the collected seed.

Revegetation

Mitigation for impacts to riparian scrub, woodland, forest and cismontane alkali marsh will include the creation of a functioning southern willow scrub community in restoration areas along Calavera and Little Encinas Creeks.

A. Wetland Creation and Restoration

1. Goal of Mitigation

The purpose of this wetland creation and enhancement is to replace functions and habitat values lost by impacts to wetlands and non-wetland jurisdictional waters from the proposed project. The quality of the created habitat will exceed that of the existing wetland habitat. This proposed mitigation would provide for a net increase in wetland acreage and an increase in habitat values beyond extant conditions.

2. Types of Habitat to Be Created

Impacts to jurisdictional wetlands and non-wetland jurisdictional waters will be mitigated by the ultimate creation of 10.7 acres of southern willow scrub vegetation along Calavera and Little Encinas Creeks. Southern willow scrub is a riparian community found along major drainages but occurs in small drainages as well. Typical southern willow scrub species occurring on the project site include arroyo willow (*Salix lasiolepis*), black willow (*Salix gooddingii*), mule fat, western sycamore, western ragweed (*Ambrosia psilostachya*), blue elderberry (*Sambucus mexicana*), and others.

Enhancement and creation will be accomplished by widening the existing channel of Calavera Creek up to an additional 150 feet and by creating additional wetlands in disturbed upland areas on Little Encinas Creek. Native species will be introduced using cuttings and seeds, as well as nursery-grown container stock.

3. Functions and Values of Habitat Created

A detailed description of the wetland functions anticipated after the mitigation site is successful is provided in Attachment 1. The proposed wetland mitigation would provide cover, nesting, and foraging opportunities for many of the local wildlife species including birds, insects, amphibians, and mammals. In particular, this restoration project will replace atypical least Bell's vireo habitat with southern willow scrub of higher quality. The created habitat (see Figure 3) offers an improved opportunity for breeding with less noise. This created southern willow scrub will also augment current vireo habitat located to the west in Agua Hedionda Creek.

4. Time Lapse

Planting and seeding will be limited to October 15 to June 1 in order to coincide with appropriate weather conditions. Establishment of a functioning southern willow scrub community is expected to take approximately four to five years.

5. Final Success Criteria

The mitigation areas will be monitored for five years following the completion of the installation of all plant materials. Each year of the monitoring period, the mitigation sites will be assessed using two methods; standard success criteria and the functional evaluation accepted by the U.S. Army Corps of Engineers (Stein 1999). Standard success criteria are based on measurements of vegetation cover, species composition, and species diversity. The functional-based mitigation success criteria are based on both interim and final goals that are assessed according to hydrologic, biogeochemical, and biologic conditions of the mitigation areas. Interim goals will be used to assess progress and will provide information for recommendations for remedial actions and adaptive management strategies. Final goals are used to certify the acceptance of the mitigation or the need for

contingency measures. Mitigation monitoring may extend beyond the initial five-year period until the sites have achieved the ultimate success criteria, or until the U.S. Army Corps of Engineers and California Department of Fish and Game determine that monitoring is no longer needed, or alternative mitigation solutions are adopted by the resource agencies.

The success of the wetland mitigation is determined using criteria based on the general site characteristics and on the functional condition of the mitigation areas. General site conditions such as wildlife use, diversity of native wetland plants, native plant cover, resilience, and presence of wetland indicators will be evaluated at each mitigation area. Functional conditions are assessed to determine the functional capacity of the specific wetland resource being created. The conditions evaluated include habitat characteristics, hydrologic regime, topographic complexity, and biogeochemical processes (Stein 1999). Each year the mitigation areas will be evaluated and scores assigned to each of the success criteria assessed. These values are then compared to the standard success criteria goals and the functional interim and final goals (Tables 2 and 3, respectively).

TABLE 2
STANDARD SUCCESS CRITERIA

Year	Native Vegetation Cover	Species Composition	Species Diversity
1	---	100% native	---
2	50%	95% native	100% target species
3	80%	95% native	100% target species
4	90%	95% native	100% target species
5	90%	95% native	100% target species

TABLE 3
FUNCTIONAL SUCCESS CRITERIA

Evaluation Criteria	Interim Target	Ultimate Target
Structural diversity	0.4	0.8
Spatial diversity	0.6	0.8
Exotic vegetation	0.8	1.0
Hydrologic regime	1.0	1.0
Floodprone area	0.8	1.0
Topographic complexity	0.5	0.8
Biogeochemistry	0.6	0.8

SOURCE: Stein 1999.

6. Target Hydrological Regime

Agricultural development on both sides of Calavera Creek have narrowed and confined the creek and vegetation to a narrow strip. The mitigation area adjacent to the channel will be excavated and widened. Vegetation in the creek channel currently receives surface runoff and water flow from Lake Calaveras through Calavera Creek. This channel will likely receive additional runoff as local development occurs. In addition to surface flow, groundwater, located within 10 feet of the surface, will facilitate revegetation.

The Little Encinas Creek mitigation area is located in a low flow detention basin east of College Boulevard Reach A and south of Reach 4a of Cannon Road (see Figure 3). This basin is designed to provide flood protection for a mobile home park located immediately downstream. The created riparian vegetation in this basin will receive runoff from Little Encinas Creek.

7. Existing Functions and Values of Mitigation Area

The existing vegetation on the mitigation areas adjacent to Calavera Creek is composed of agricultural land to the west of the creek and non-native ruderal habitat to the east of the creek. The mitigation area adjacent to Little Encinas Creek will be located on disturbed lands. This site is dominated by weedy non-native grasses.

8. Implementation

This restoration plan will use cuttings from the local area, salvaged plants collected from habitat impacted by the College Boulevard and Cannon Road extensions, as well as nursery-grown container plants. The sites will be planted with native species appropriate to southern willow scrub.

a. Site Preparation

In the mitigation area on Calavera Creek, heavy equipment will be used to widen the existing channel by approximately 200 feet west and 150 feet east of the creek. This will create a planting area in the channel bottom within five to ten feet of the water table. In the mitigation area on Little Encinas Creek, heavy equipment will be used to bring the soil surface closer to groundwater. Where possible, the existing riparian vegetation will be clearly marked to remain undisturbed by earth-moving activities. The project biologist will be on-site during grading to ensure minimum impacts to the existing wetland vegetation.

b. Irrigation

Precipitation in southern California is often irregular with on average one out of every three years experiencing drought. Restoration projects dependent on natural rainfall can be severely hampered by poor rainfall years. To improve restoration success and provide

greater flexibility in project implementation, an automated overhead sprinkler irrigation system will be installed prior to planting.

c. Container Plants

Willow, cottonwood, and mule fat cuttings will be taken from trees within a 10-mile radius of the mitigation site. These cuttings will be rooted in one-gallon containers for planting at the wetland creation site. San Diego sagewort (*Artemisia palmeri*) and blue elderberry will be grown from locally collected seeds. Cuttings and container plant densities are presented in Table 4. Installation of native plants will begin after grading of the wetland habitat restoration area. Plant installation will be limited to the months of October 15 through June 1.

TABLE 4
RIPARIAN SCRUB PLANTING DENSITIES

Species	Number per Acre	Size
Mule fat <i>Baccharis salicifolia</i>	200	one-gallon
Arroyo willow <i>Salix lasiolepis</i>	100	one-gallon
Black willow <i>Salix gooddingii</i>	100	one-gallon
Red willow <i>Salix gooddingii</i>	100	one-gallon
Western sycamore <i>Platanus racemosa</i>	75	one-gallon
Blue elderberry <i>Sambucus mexicana</i>	50	one-gallon
California rose <i>Rosa californica</i>	50	one-gallon
Fremont cottonwood <i>Populus fremontii</i>	25	one-gallon

d. Seed Collection and Application

Seed collection will begin at least six months prior to restoration implementation. Following installation of salvaged and container plants, the mitigation sites will be seeded. Two different seed mixes will be prepared for the project site. One species mix will be used for low-lying areas that will eventually become riparian understory and a second upland mix will be used for berm slopes and transitional areas. To prevent disturbance of transplants, the riparian understory seed mix will be applied by hand. The upland seed mix may be either hand seeded or hydroseeded as directed by the project biologist. Target species and application rates for both seed mixes are included in Table 5.

TABLE 5
RIPARIAN AND TRANSITIONAL AREA SEED MIXES

Species	Pounds/Acre	Suggested %Purity/%Germination
Riparian Seed Mix		
Arroyo willow <i>Salix lasiolepis</i>	2	N/A
Mugwort <i>Artemisia douglasiana</i>	1	10/50
Mule fat <i>Baccharis salicifolia</i>	3	2/20
Western ragweed <i>Ambrosia psilostachya</i>	2	85/25
Tarragon <i>Artemisia dracunculus</i>	1	10/50
Transitional Area and Slope Mix		
Blue elderberry <i>Sambucus mexicana</i>	2	95/20
California buckwheat <i>Eriogonum fasciculatum</i>	3	10/65
California sagebrush <i>Artemisia californica</i>	2	15/50
Purple needlegrass <i>Nassella pulchra</i>	3	70/60
Giant ryegrass <i>Leymus condensatus</i>	0.25	70/80

B. Buffers

Buffer areas will be provided adjacent to preserved portions of Calavera Creek and Little Encinas Creek, including the proposed mitigation sites. The buffers are composed of a mixture of native and non-native habitat types (see Figure 3). Buffer distances are anticipated to range from a minimum of 100 feet to several hundred feet from the edge of the wetland habitat, depending on the location. Edge effects are anticipated to be very limited given the size and location of buffer areas adjacent to the mitigation areas and preserved portions of the creeks.

C. As-built Plan

Within 45 days of the completion of mitigation implementation, an as-built plan will be submitted to the City of Carlsbad, CDFG, and USACE. This plan will include

implementation dates, plant numbers and locations, and any significant problems encountered or if changes are needed to be made in the field during implementation of the final restoration plan, to determine if the mitigation project has been built as proposed.

Maintenance and Monitoring

The objectives of the maintenance and monitoring program are to ensure successful habitat establishment and development of an information base, which documents the maintenance and monitoring efforts. To achieve these objectives, the project biologist will observe and direct restoration implementation, maintenance, and monitoring activities.

The monitoring and maintenance period will begin immediately upon completion of plant installation and will last for a period of five years, as presented in Table 6. The maintenance program will ensure that debris removal, weed control, replanting and reseeding, site protection, and other tasks are adequately performed. Maintenance measures will be conducted as outlined below for all restoration and enhancement areas.

TABLE 6
FIVE-YEAR MAINTENANCE AND MONITORING SCHEDULE

Tasks	Year 1	Year 2	Year 3	Year 4	Year 5
Weeding	Quarterly	Quarterly	Quarterly	Biannually	Biannually
Trash removal	Monthly	Quarterly	Quarterly	Quarterly	Quarterly
Qualitative monitoring	Monthly	Monthly	Quarterly	Quarterly	Quarterly
Quantitative monitoring	None	Spring	Spring	Spring	Spring

A. Implementation Monitoring

The mitigation monitoring period will begin with initial site grading and will last for five years following completion of planting. To ensure that conditions of this restoration plan are adhered to, all implementation activities will be monitored and recorded by the project biologist. The biologist will be available on-site during revegetation implementation to assist in making necessary plan modifications so the work may proceed. Records will include dates of translocation of salvaged species, container plantings, and seeding. These will be included in the first annual report.

B. General Maintenance Procedures

General maintenance will begin following the installation of all plant materials. Maintenance tasks are anticipated to continue for five years.

1. Vegetation Clearing and Trash Removal

Pruning of any native vegetation or removal of dead wood and leaf litter shall not be allowed in the revegetation areas. Trash will be removed from the sites by hand on a monthly basis for the duration of the first year and quarterly thereafter. Trash consists of all man-made materials, equipment, or debris left within the restoration area that is not serving a function related to revegetation.

2. Weed Control

Weed control will continue throughout the five-year monitoring period. Utility easements adjacent to or within the restoration areas will be included in weed control activities for the project. Hand weeding or other weed control methods will be performed by maintenance workers familiar with and trained to distinguish weeds from native species. Dethatching will be performed on an as-needed basis. During the first year, weeding will be performed quarterly (or more often as determined by the project biologist) to keep weeds from producing seeds and to control weed competition during the establishment period of native plants. Weed control will continue quarterly for years two and three and twice a year or as needed in years 4 and 5.

Weeds will be killed or removed before they set seeds. Appropriate weed control measures will be implemented under the direction of the project biologist. A list of exotic species anticipated on the site is presented in Table 7. In the event that additional invasive species are encountered, the project biologist shall refine control measures to address the problem.

TABLE 7
ANTICIPATED EXOTIC SPECIES

Scientific Name	Common Name
<i>Arundo donax</i>	Giant reed
<i>Cynara cardunculs</i>	Artichoke thistle
<i>Brassica nigra</i>	Mustard
<i>Cortaderia selloana</i>	Selloa pampas grass
<i>Erodium</i> sp.	Filaree, storksbill
<i>Avena barbata</i>	Wild oats
<i>Foeniculum vulgare</i>	Sweet fennel
<i>Nicotiana glauca</i>	Tree tobacco
<i>Ricinus communis</i>	Castor bean
<i>Raphanus sativus</i>	Wild radish

3. Irrigation

The irrigation will be applied at the discretion of the project biologist. The irrigation schedule will vary depending on weather patterns. Irrigation systems will be maintained throughout the five-year maintenance period. The addition of supplemental water to the mitigation areas will be gradually decreased and eventually discontinued prior to the end of the five-year monitoring period.

C. Qualitative Monitoring

Evaluating plant health and identifying and correcting problems are necessary for ensuring successful vegetation establishment. The site will be monitored weekly during site preparation, monthly for the first two years, and quarterly for the remainder of the project. The project biologist will review the restoration areas to examine transplant vigor, and exotic plant encroachment. The biologist will document the findings and make recommendations for remedial actions, if necessary.

A list of plant and wildlife species observed on the restoration site will be compiled during each qualitative monitoring visit. A list of plant species present and a description of wildlife (including least Bell's vireo) use will be included with each annual report.

D. Quantitative Monitoring

Quantitative monitoring will be performed to measure development of vegetation in the restoration and enhancement areas and to document that the restoration areas achieve the success criteria as defined by the performance standards.

Beginning in year 2, permanent vegetation sampling stations will be established within each restoration site to measure year-to-year changes in shrub or tree cover, and diversity following the protocol of the California Native Plant Society Plant Communities Project (Sawyer and Keeler-Wolf 1995).

The CNPS sampling method is based on a 50-meter point transect centered on a 5×50-meter plot. Using this method, vegetation is sampled by the point method at 0.5-meter intervals along the 50-meter transect to determine cover. The surveyor will note the species encountered and classify its height (i.e., herb, shrub, or tree) at each interval. In addition, each shrub-sized individual of each perennial species growing in the 5×50-meter plot will be counted to determine shrub presence and diversity. All annuals present in the 5×50-meter plot will also be noted.

Sampling will be conducted in the spring so that the maximum species diversity will be recorded. At least three plots per mitigation area will be used to determine vegetation

cover, plant community composition, and plant diversity. A photograph will be taken from each sample endpoint (toward the plot) each time the site is monitored to record the progress of mitigation over the monitoring period.

E. Monitoring Reports

Annual reports summarizing monitoring results will be submitted to CDFG, USACE, and the City of Carlsbad by the project biologist by December 31 of each year. The quantitative report will include survey methods, data summary analysis, performance standards comparison, discussion, remedial action discussion, recommendations, and photodocumentation. Each annual report will compare findings of the current year with those in previous years.

F. Performance Standards

Restoration of the Calaveras Creek mitigation areas will be considered successful when both the standard and functional performance criteria have been met. If the minimum levels for any one of the measurements (see Tables 2 and 3) are not achieved in any year, the project biologist will implement remedial actions, such as replanting container stock, to reach the following year's expected levels. In order to meet the performance standards, the habitat must sustain itself for a minimum of one year (meeting the fifth-year performance standards) in the absence of significant maintenance measures any year during the five-year monitoring period. Significant maintenance includes replanting and eradication of weed infestations. Other maintenance measures, such as minor weed control, may continue until the end of the monitoring period.

1. Tolerance of Weeds

The cover of non-native annual grasses and herbs, such as brome grass or filaree, as identified by the project biologist, will be no more than 5 percent of the total vegetation cover. No invasive exotic perennials, such as giant reed, pampas grass, and tamarisk, will be permitted on the revegetation sites.

2. Remedial Measures

If performance criteria are not achieved at the end of the fifth year, the permittee will consult with CDFG, USACE, and the City of Carlsbad to determine whether the mitigation effort is acceptable. The owner/project proponent understands that failure of any significant portion of the mitigation area may result in a requirement to replace or revegetate that portion of the site.

G. Notification of Completion

At the end of the fifth year, a final report will be submitted to the resource agencies evaluating the success of the mitigation. The report will make a determination of whether the requirements of the mitigation plan have been achieved.

At the conclusion of the five-year monitoring period, or at such time the project has achieved the performance standards, the project biologist shall inform the owner/project proponent, CDFG, USACE, and the City of Carlsbad. A site review will be scheduled for all parties to review the revegetated sites. Upon confirmation of project success, the agencies shall release the owner/project proponent of all obligations.

References Cited

Sawyer, J. O., and T. Keeler-Wolf

1995 *A Manual of California Vegetation*. California Native Plant Society. Sacramento.

Stein, E.

1999 Function-Based Performance Standards for Evaluating the Success of Riparian and Depressional/Emergent Marsh Mitigation Sites. Prepared for the U.S. Army Corps of Engineers, Los Angeles District – Regulatory Branch. May.

**CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION**

**FACT SHEET
for
ORDER NO. R9-2002-0014
WASTE DISCHARGE REQUIREMENTS AND
SECTION 401 WATER QUALITY CERTIFICATION
FOR
CALAVERA HILLS II, LLC AND CITY OF CARLSBAD
CALAVERA HILLS MASTER PLAN PHASE II & BRIDGE AND
THOROUGHFARE DISTRICT NO. 4 & DETENTION BASINS
SAN DIEGO COUNTY**

PROJECT

The Calavera Hills Master Plan Amendment and Bridge and Thoroughfare District No. 4, includes three project components: (1) an amendment of the Calavera Hills Master Plan and construction of Phase II; (2) extensions of College Boulevard (Reaches A-C) and Cannon Road (Reaches 3 and 4A) within the City of Carlsbad Bridge and Thoroughfare District No. 4; and (3) two detention basins within the Calavera Creek watershed.

Calavera Hills Master Plan Phase II (819 acres) would modify existing land use designations and rearrange residential densities to provide for the residential buildout of Villages K, L-2, R, U, W, X, and Y (Figure 1). The Calavera Hills Master Plan Project is also required to construct College Boulevard Reaches B and C and Cannon Road Reach 3 to provide access to the site. Construction of College Boulevard Reach A and Cannon Road Reach 4A would not be a Master Plan requirement. Cannon Road Reach 4B was previously part of the proposed project but was deleted from the project to allow for further environmental analysis and resolution of outstanding issues. The second component of the project is the formation by the City of Carlsbad of Bridge and Thoroughfare District No. 4 for the extensions of College Boulevard and Cannon Road. The third component of the project consists of the construction of two detention basins by the City of Carlsbad to control flooding impacts within the Calavera Creek and Little Encinas Creek watersheds.

Existing Waters of the U.S. (acres) that occur within the project boundaries are summarized below.

Plant Community	Master Plan Phase II	Bridge and Thoroughfare District and Detention Basins
Riparian Woodland	0.2	15.1
Riparian Scrub	7.2	3.3
Riparian Forest	0	2.0
Cismontane Alkali Marsh	0	1.0
Cismontane Alkali Marsh (seasonal)	0.1	0.5
Freshwater Marsh	0.5	0.2
Unvegetated Waters	1.2	0.4
Total	9.2	22.5

Waters of the U. S. on the project site serve as habitat for the least Bell's vireo (federally endangered), white-tailed kite (state fully protected species), northern harrier (state species of concern), and Cooper's hawk (state species of concern). Other federally and state-listed species associated with aquatic and wetland habitats that may occur on the project site, but were not observed, include Harbinson's dun skipper, yellow-brested chat, and blue grosbeak.

Isolated waters, as defined by the Solid Waste Agencies of Northern Cook County court decision, occur within the project boundaries. These waters account for approximately one-tenth of an acre; approximately 0.07 acre will be impacted by project development.

Mitigation for impacts to vegetated waters of the U.S. will be mitigated at a ratio of 3:1 and for unvegetated waters at a ratio of 1:1 through the creation of 11.6 acres of jurisdictional waters of the U.S. along Calavera and Little Encinas Creek (Figure 2). Created jurisdictional habitats include southern willow scrub, riparian forest, riparian woodland, and alkali marsh. Mitigation will be conducted in accordance with the Habitat Restoration and Monitoring Plan prepared by RECON (October 26, 2001). (See Attachment 2 to Tentative Order No. R9-2002-0014)

LOCATION

The proposed project is located in the City of Carlsbad (Figures 3 and 4). The Calavera Hills Master Plan area is bounded by the City of Oceanside and State Route 78 to the north, with the southern boundary being an east-west line approximately one-half mile north of the Rancho Carlsbad Mobile Home Park. The Master Plan's western extent is near Carlsbad Village Drive and the eastern boundary is just west of Lake Calavera. College Boulevard runs roughly north-south between El Camino Real and State Route 78. Cannon Road runs roughly east-west between El Camino Real and the City of Oceanside boundary.

DISCHARGE DESCRIPTION

This Tentative Order addresses the discharge of fill material into jurisdictional waters of the United States and State. The project will result in the discharge of waste, defined as the placement of fill material (e.g., soil, riprap, culverts), into 3.7 acres of waters of the United States and State, including wetlands, that are tributaries to, and including, Calavera Creek, Little Encinas Creek, and Agua Hedionda Creek. Impacts to jurisdictional waters of the U.S. (in acres) are summarized below.

	<u>Master Plan Development</u>		<u>Cannon Road</u>		<u>College Boulevard</u>		
Habitat Type*	Perm.	Temp.	Perm.	Temp.	Perm.	Temp.	Total
Alkali Marsh	0.1		0.6	0.07			0.77
Riparian Scrub (mfs or sws)			0.2	0.03	0.3	0.02	0.55
Sycamore Woodland			0.6	0.12	1.3	0.15	2.17
Unvegetated waters	0.2	0.01					0.21
Total	0.3	0.01	1.4	0.22	1.6	0.17	3.7

* mfs = mule fat scrub; sws = southern willow scrub

Approximately 0.07 acre of the State (i.e., isolated waters) would also be impacted by the proposed project. The majority of impacts to waters of the U.S. (approximately 94 percent) would result primarily from the extensions of Cannon Road and College Boulevard.

BASIN PLAN WATER QUALITY OBJECTIVES, BENEFICIAL USES, AND PROHIBITIONS

The Basin Plan established the following beneficial uses of surface water in the Carlsbad Hydrologic Unit, Agua Hedionda Hydrologic Area (4.31) and Buena Vista Creek Hydrologic Area (4.20): Municipal and Domestic Supply (MUN), Agricultural Supply (AGR), Industrial Process Supply (IND), Contact and Non-Contact Water Recreation (REC-1 and REC-2), Warm Freshwater Habitat (WARM), Rare, Threatened, or Endangered Species (RARE), and Wildlife Habitat (WILD). Beneficial uses identified for Agua Hedionda and Buena Vista Lagoons include IND, REC-1 and REC-2, Commercial and Sport Fishing (COMM), Estuarine Habitat (EST), WILD, RARE, WARM, Marine Habitat (MAR), Aquaculture (AQUA), Migration of Aquatic Organisms (MIGR), and Shellfish Harvesting (SHELL). No beneficial uses were designated for ground water within the project area.

The Basin Plan established the following Waste Discharge Prohibitions pursuant to CWC 13243:

The discharge of sand, silt, clay, or other earthen materials from any activity, including land grading and construction, in quantities which cause deleterious bottom deposits, turbidity or discoloration in waters of

the state or which unreasonably affect, or threaten to affect, beneficial uses of such waters is prohibited.

CALIFORNIA ENVIRONMENTAL QUALITY ACT

An Environmental Impact Report (EIR) was prepared pursuant to the California Environmental Quality Act. A Notice of Preparation (NOP) was distributed for the project on November 12, 1999. Responses to the NOP were incorporated into the EIR. Four public scoping meetings were held on September 16, 1999, January 31, 2000, March 8, 2000, and April 20, 2000. At each of the public scoping meetings, project components were presented to the public by the City of Carlsbad Planning and Engineering Departments. Written comments from the scoping meetings and on the draft EIR were included in the Final EIR. The City of Carlsbad is expected to approve the Final EIR on January 15, 2002. The EIR describes potential impacts and related mitigation measures for Hydrology and Water Quality, Biological Resources, Land Use, and other issues.

The proposed project has the potential to impact water quality standards. The draft EIR provided a brief discussion of existing water quality and hydrology, expected impacts, and mitigation measures. The Final EIR requires the following mitigation for hydrology and water quality impacts:

- Comply with State Water Resources Control Board Water Quality Order No. 99-08-DWQ, the NPDES General Permit for Storm Water Discharges Associated with Construction Activity;
- Comply with the Municipal Storm Water Permit (NPDES No. CAS0108758);
- Comply with the City of Carlsbad procedures;
- Create desiltation basins where necessary to minimize erosion and prevent sediment transport, until the storm drain system is in place and streets are paved;
- Landscape all exposed, manufactured slopes per City of Carlsbad erosion control standards; and
- Phase grading operations and slope landscaping to reduce the susceptibility of slopes to erosion; and control sediment production from graded building pads with low perimeter berms, desiltation basins, jute matting, sandbags, bladed ditches, or other appropriate methods.

The Final EIR requires onsite creation, restoration, and/or enhancement of waters of the U.S. for impacts to waters of the U.S., but does not specify mitigation design and success criteria.

BASIS FOR TENTATIVE WASTE DISCHARGE REQUIREMENTS

This Order establishes discharge specifications for the discharge of fill material pursuant to Division 7 of the California Water Code and Article 4, Title 23 of the California Water Code.

This order establishes mitigation and monitoring provisions based on best professional judgement. The Basin Plan states "certification is dependent upon the assurances that the project will not reduce water quality below applicable standards as defined in the Clean Water Act (i.e., the water quality objectives established and the beneficial uses which have been designated for the surface waters.)"

The existing wetland functions of most of the jurisdictional areas on the project site have been altered due to agriculture and off-road vehicle activities. Wetland functions for the project site and mitigation areas were determined by RECON (Attachment A) using the *Function-Based Method for Assigning Mitigation Ratios for Impacts to Riparian Systems* provided by the U.S. Army Corps of Engineers. Structural diversity, spatial diversity, habitat contiguity, invasive vegetation, hydrologic regime, flood-prone area, topographic complexity, and biogeochemical processes were evaluated and ranked for Calavera Creek, Little Encinas Creek, Agua Hedionda Creek, and adjacent wetlands and unvegetated waters of the U.S. The three creeks are of relatively moderate to high quality with regards to the assessed functions. The proposed project avoids impacting the majority of higher quality wetlands onsite.

The proposed College Boulevard and Cannon Road segments are part of the regional transportation system, are necessary to maintain the required levels of service, and are responsible for the majority of impacts to waters of the U.S. The locations of the road segments are, in part, determined by the existing portions of these roads and by environmental constraints. The applicant analyzed eight alternative road alignments through the CEQA process, an additional alignment as part of the permitting process, and looked at alternative crossings (e.g., bridge, culverts). Staff have reviewed the conclusions reached in the development of the selected road alignments and crossing structures and agree that the proposed project will protect water quality. However, additional alternatives that are more protective of wetland habitat occupied by the federally listed least Bell's vireo may be possible in light of the removal of Cannon Road Reach 4B from the project. The U.S. Army Corps of Engineers has questioned the need and location of Cannon Road Reach 4A; if this section is not necessary, then alternative alignments and intersections may be possible. Alternatives excluding Cannon Road Reach 4A have not been developed, and it is not known if they would result in additional protection of water quality as they would still result in impacts to wetland habitat. Attachment B provides a discussion of alternative road alignments and bridge alternatives; this discussion includes Cannon Road Reach 4A only.

The applicant has avoided impacts to high quality waters onsite and will enhance these waters through mitigation. Implementation of the proposed mitigation plan will enhance habitat and water quality functions onsite; this, in turn, will improve water quality and beneficial uses. Placing conservation easements over the preserved drainages and mitigation areas will ensure that they continue to function as natural systems, providing water quality and beneficial uses in perpetuity. Therefore, the requirements of this Order are consistent with the Basin Plan.

Potential impacts to water quality resulting from construction and project build-out will be addressed through the Construction Stormwater Permit and the Municipal Stormwater Permit, respectively. The Municipal Stormwater Permit states:

Since the copermittees utilize their legal authority to authorize urbanization, they must also exercise their legal authority to ensure that the resulting increased pollutant loads and flows do not further degrade receiving waters.

The City of Carlsbad is a Copermittee, as defined in the Municipal Stormwater Permit, and is responsible for ensuring that the proposed project does not increase pollutant loads or degrade receiving waters. The City of Carlsbad is also a coapplicant and is required to comply with the prohibitions and provisions of Tentative Order No. R9-220-0014. Additionally, implementation of the proposed BMPs (Attachment 1 to Tentative Order No. R9-2002-0014) will protect receiving waters.

The proposed detention basins are designed to allow natural flows to continue through Calavera and Little Encinas Creeks. The basins are designed to capture flood flows that result from over-topping of the existing banks during 10-year or greater storm events. The basins will provide flood protection for downstream land uses while maintaining natural riverine functions.

This order establishes water quality certification provisions based on Article 4, Title 23 of the California Water Code and best professional judgement.

Standard provisions, reporting and record keeping requirements, and notifications are established in accordance with Division 7 of the California Water Code.

MONITORING AND REPORTING REQUIREMENTS

Requirements for monitoring and reporting for the Calavera Hills Master Plan Phase II, Bridge and Thoroughfare District No. 4, and Detention Basins project are found in Monitoring and Reporting Program No. R9-2002-0014.

WRITTEN COMMENTS

Interested persons are invited to submit written comments upon these waste discharge requirements. Comments should be submitted either in person during business hours or by mail to:

John H. Robertus
Executive Officer
Attn: Stacey Baczowski
California Regional Water Quality Control Board
9174 Sky Park Court, Suite 100
San Diego, CA 92123

All comments received by 4:00 p.m. on January 30, 2002, will be considered in the formulation of determinations.

PUBLIC HEARING

Tentative Order No. R9-2002-0014 will be considered by the San Diego Regional Board at a public hearing on:

February 13, 2002

at the following location:

City of Mission Viejo
City Council Chambers
25909 Pala
Mission Viejo, California

The Board may adopt Tentative Order No. R9-2002-0014 with or without modification, deny without prejudice, or deny adoption.

ADDITIONAL INFORMATION

For additional information, interested persons may write to the following address or contact Stacey Baczkowski of the Regional Board staff at 858-637-5594.

California Regional Water Quality Control Board
Attn: Stacey Baczkowski
9174 Sky Park Court, Suite 100
San Diego, CA 92123

Copies of the tentative waste discharge requirements and other documents (other than those the Executive Officer maintains as confidential) are available at the Regional Board office for inspection and copying. Please contact Michael Gallina at 858-636-3137 for file review times and procedures.

WDR REVIEW

A person may petition the State Board to review the decision of the Regional Board regarding the final WDR. A petition must be made within 30 days of the Regional Board taking an action.

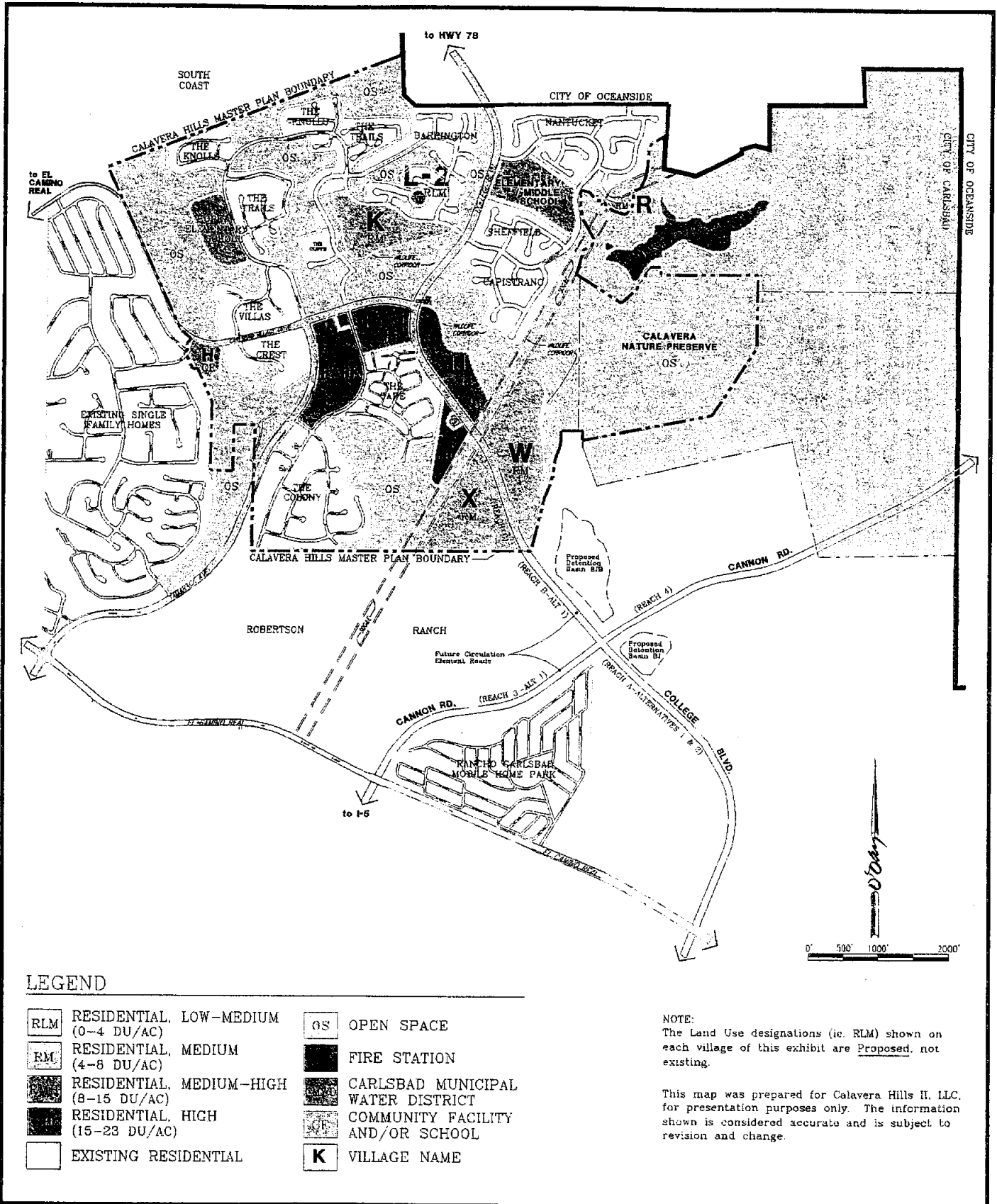
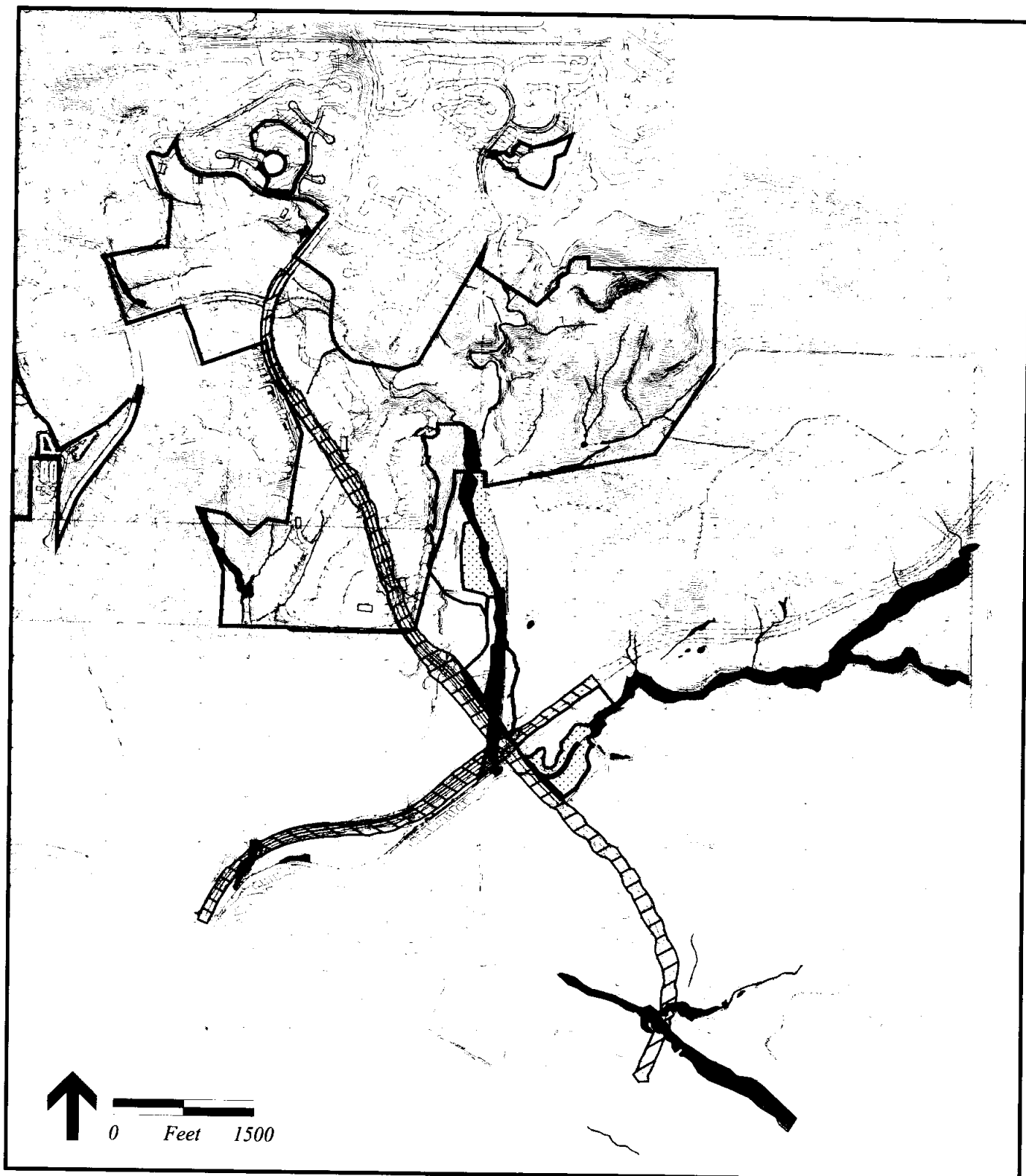


FIGURE 1
Calavera Hills Vicinity Map







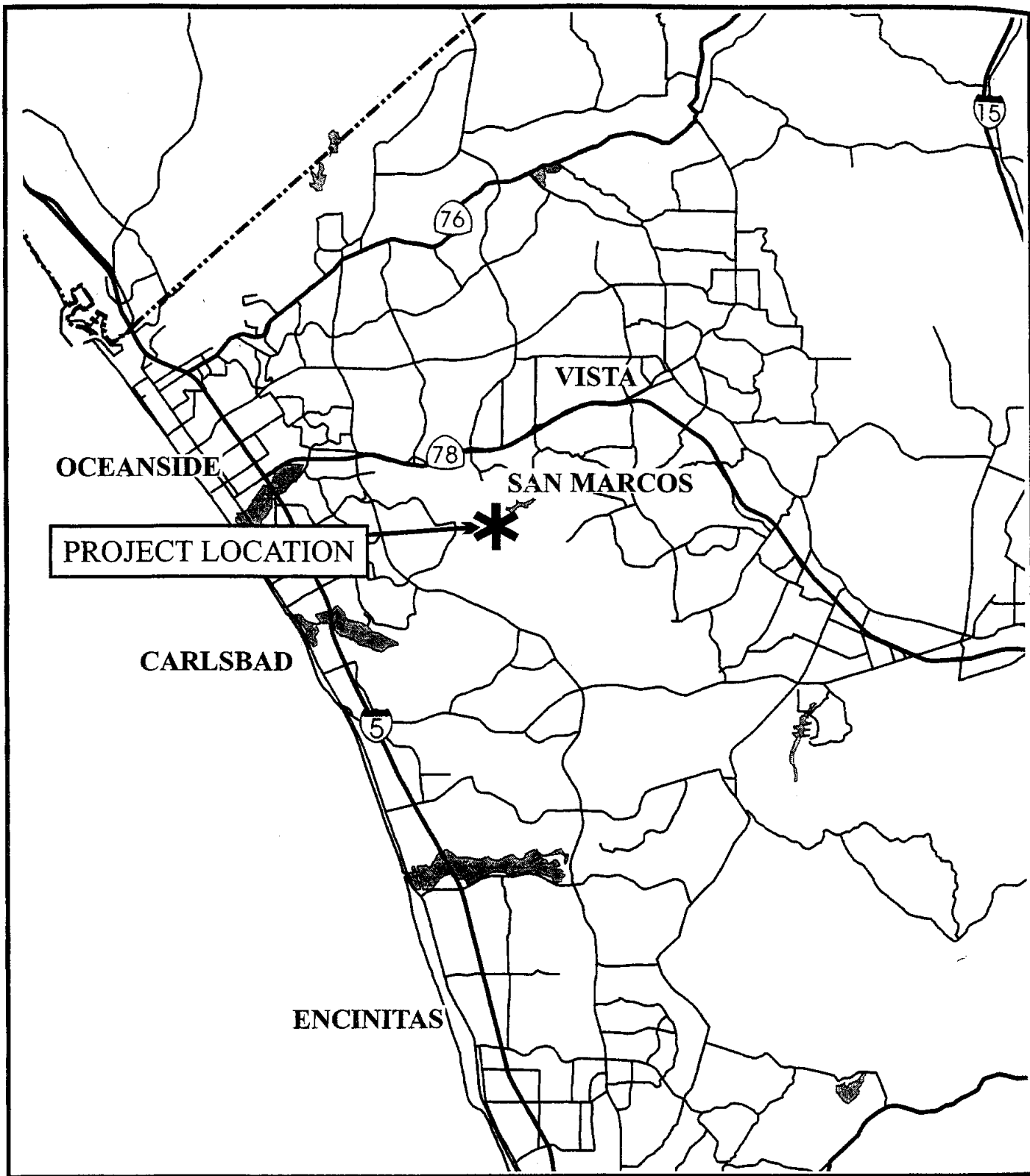
-  Project Boundary
-  Jurisdictional Waters
-  Location of Mitigation Site
-  Buffer

FIGURE 2
Wetland Mitigation
Site Locations



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FIGURE 3
Regional Location of the Project

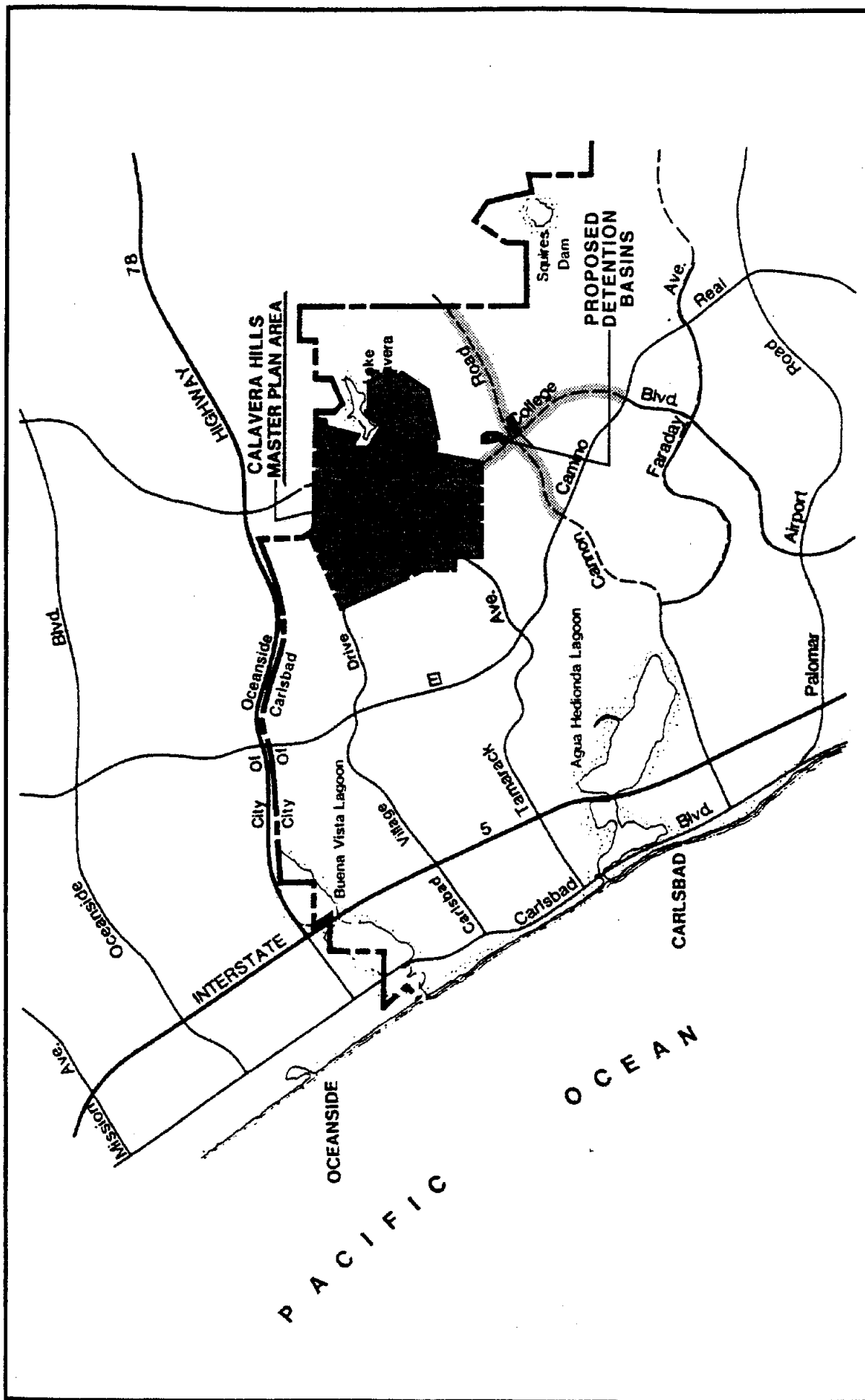


FIGURE 4
Project Vicinity Map

Source: Planning Systems 8/00



NO SCALE

R-3225E



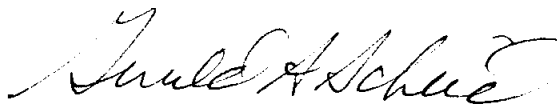
ATTACHMENT A
TO
FACT SHEET FOR
TENTATIVE ORDER NO.
R9-2002-0014

**WETLAND FUNCTIONAL ANALYSIS FOR THE CITY
OF CARLSBAD BRIDGE & THOROUGHFARE
DISTRICT NO. 4, THE CALAVERA HILLS PROJECT,
AND THE DETENTION BASINS PROJECT IN
CARLSBAD, CALIFORNIA**

Prepared for

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Prepared by



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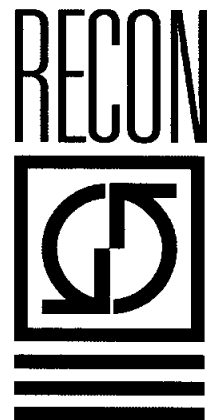


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Introduction

The wetland functional analysis contained in this report provides a description of the functions and values of the existing wetland and proposed mitigation areas. This document has been prepared to embody the Function-Based Method for Assigning Mitigation Ratios for Impacts to Riparian Systems (Stein 1999a). Anticipated wetland functions and values at the proposed mitigation sites are also discussed.

Project Description

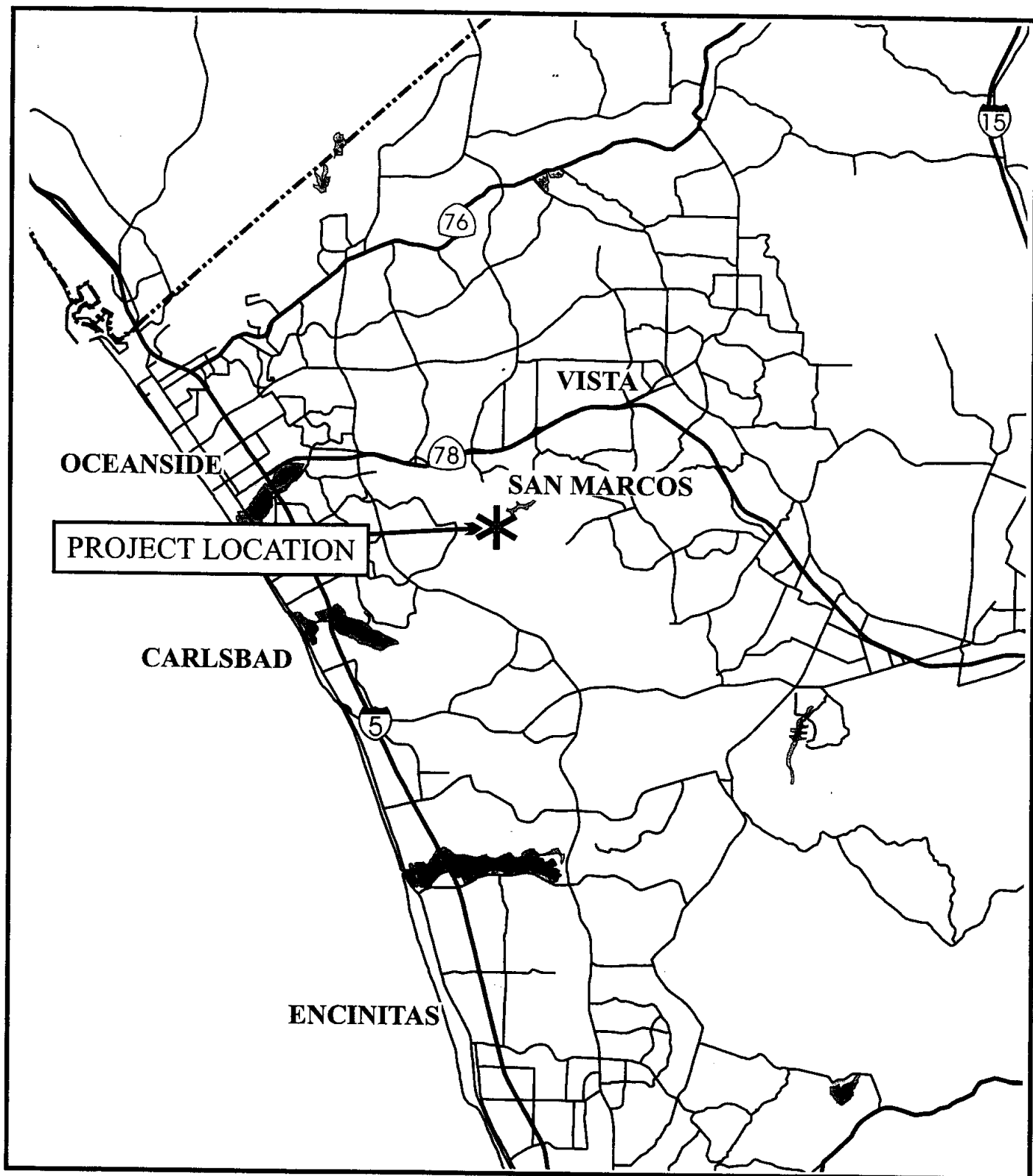
A. Project Location

The Calavera Hills Master Plan Amendment & Bridge and Thoroughfare District No. 4 & Detention Basin project is located in the northeast quadrant of the city of Carlsbad (Figures 1 and 2). The 412.6-acre Calavera Hills Master Plan Phase II development area is bounded by the Oceanside city limits along with State Route 78 (SR-78) on the north and the southern boundary being approximately one-half mile north of the Rancho Carlsbad Mobile Home Park. The master plan's western extent is near Carlsbad Village Drive and the easterly boundary is just west of Calavera Lake. The College Boulevard and Cannon Road extensions run north-south, east-west (respectively) between the Rancho Carlsbad Mobile Home Park and the Master Plan area. The detention basins would be located near the roads on Calavera Creek and Little Encina Creek. Watercourses that occur within the project area include Calavera Creek, Agua Hedionda Creek, and Little Encina Creek.

B. Summary of Overall Project

The proposed Phase II of the Master Plan would allow for the construction of a maximum of 781 residential units within a series of villages. Other community facilities and infrastructure improvements to the Phase II Master Plan area are roads, utility lines, drainage improvements, and other public and community facilities.

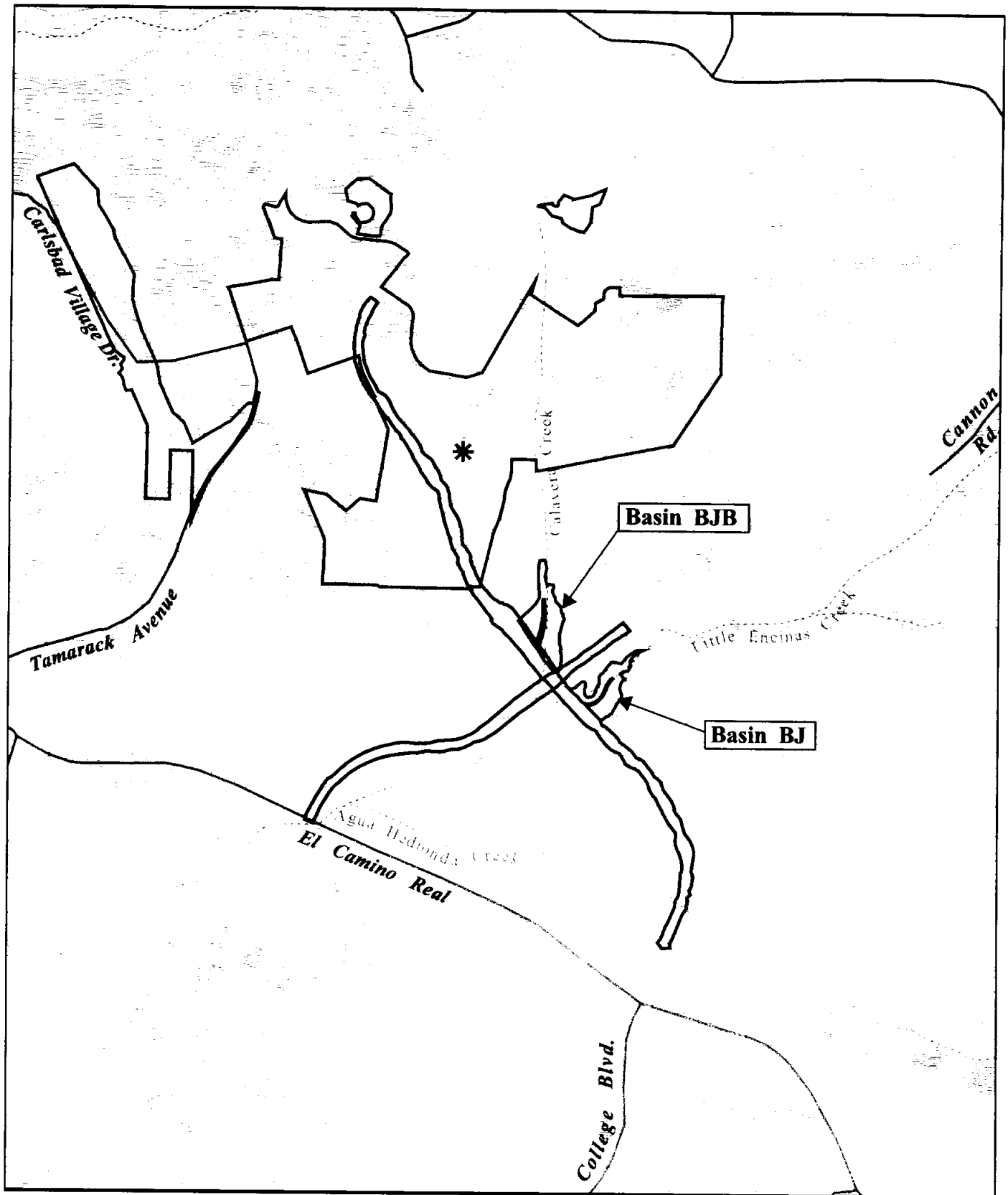
The second component of the project is the formation by the City of Carlsbad of a Bridge and Thoroughfare District No. 4 for the extensions of College Boulevard and Cannon Road. College Boulevard (Reaches A, B, and C) would be extended from within the Calavera Hills Master Plan at Carlsbad Village Drive southerly to El Camino Real (approximately 9,500 feet). The Bridge and Thoroughfare District encompasses the reach of College Boulevard (Reach C) that lies within the boundaries of the Calavera Hills Master Plan. Cannon Road (Reaches 3 and 4) would be extended from El Camino Real easterly to the city of Oceanside (approximately 9,100 feet). Although the Bridge and



0 MILES 2.2 4.4

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FIGURE 1
Regional Location of the Project



0 Feet 2000



Man-made pond



Master Plan Phase II



Bridge and Thoroughfare District



Detention basins

FIGURE 2
Project Vicinity

Thoroughfare District funding is not expected to include Cannon Road Reach 4, it is included in this permit application to provide the cumulative effect of the project. Final design changes are being considered for Cannon Road Reach 4 that could further minimize impacts to jurisdictional waters through avoidance and buffer areas. A total of 94 percent of the wetland impacts are a result of construction of these roadway links.

The design of Reaches A-C for College Boulevard and Reaches 3-4 for Cannon Road included all grading, improvements, bridges, retaining walls, erosion control and landscaping, drainage, and all other improvements associated with development of major arterial roadways. Both Cannon Road and College Boulevard are shown on the City's circulation element as major arterials within a 102-foot right-of-way (widened at intersections). Buildout design standards for major arterials include two 12-foot travel lanes in each direction with an 18-foot median separating the travel directions.

The third component of the project consists of the construction of two detention basins by the City of Carlsbad to control flooding impacts within the Calavera Creek watershed. These basins have been recommended near the northeast corner of the Rancho Carlsbad Mobile Home Park. Basin 1 (referred to as Basin "BJB") at the northeast quadrant of the College Boulevard/Cannon Road intersection, in its ultimate configuration, would have an inundation area of approximately 15 acres and a storage capacity of 49 acre-feet. Basin 2 (referred to as Basin "BJ") is located southeast of the College Boulevard/Cannon Road intersection and would have an inundation area of approximately eight acres with a storage volume of 48 acre-feet. The basins are part of a larger drainage plan for the area, and are consistent with the 1994 City of Carlsbad Master Drainage Plan. The road crossings of Calavera Creek and Little Encina Creek form the berms for the detention basins.

Wetland Functions of Existing Jurisdictional Areas to be Impacted

The wetland functions of most of the jurisdictional areas on the project site have been altered due to agricultural and off-road-vehicle activities on the property. Wetland functions for the project site and mitigation areas were determined using the Function-Based Method for Assigning Mitigation Ratios for Impacts to Riparian Systems provided by the U.S. Army Corps of Engineers (Stein 1999a). This methodology compares the wetland functional loss at the proposed impact site with the proposed wetland functional gain at the mitigation site.

The criteria used to determine the wetland functions are based on characteristics of the habitat, hydrology/floodplain, and biogeochemical processes. Habitat characteristics used include structural diversity, spatial diversity, contiguity, and presence of invasive vegetation. Hydrology/floodplain characteristics involve a determination of the hydrologic regime (the source of water to a site), characteristics of the flood-prone area (e.g., channel confinement and overbank flow), and topographic complexity of the floodplain (e.g., presence of pits, ponds, large boulders, and rills). Biogeochemical processes are determined from estimates of vegetation cover (roughness) and amount of debris, leaf litter, and detritus present (organic carbon).

There are three main wetland/riparian areas within the proposed road improvement portion of the project; Calavera Creek, Agua Hedionda Creek, and Little Encina Creek. Each of these major drainage features has smaller wetland tributaries that convey local runoff to the creeks. In a few locations, small wetland areas are adjacent to the creeks along these tributaries. The Master Plan area also contains some small patches of wetland along the predominately non-wetland jurisdictional waters that drain to the north and west away from the three major creeks. The rank given each wetland function for each major creek and the Master Plan area with their associated adjacent wetlands and non-wetland waters is given in Tables 1 through 4. A description of each ranked functional criteria is provided. Non-wetland drainages are vegetated with mostly upland shrubs.

A. Habitat Characteristics

Four habitat characteristics are evaluated for riverine systems. These are structural diversity, spatial diversity, contiguity, and presence of invasive vegetation. In addition, other biological values are also considered (i.e., wildlife corridors).

1. Structural Diversity

The structural diversity is determined by ranking a site with respect to the presence of different layers in the vegetation. These layers include tree, shrub, and understory.

TABLE 1
FUNCTIONAL ANALYSIS RATINGS FOR CALAVERA CREEK

Function Evaluation Criteria	Rating: Calavera Creek	Rating: Adjacent Marsh Wetlands	Rating: Adjacent Non-wetland Waters
Structural diversity	0.8	0.6	0.2
Spatial diversity	0.8	0.4	0.2
Habitat contiguity	0.4	0.2	0.2
Invasive vegetation	0.6	0.8	0.8
Hydrologic regime	1.0	1.0	1.0
Flood-prone area	0.7	0.7	0.7
Topographic complexity	0.2	0.2	0.6
Biogeochemical processes	0.8	0.6	0.8

TABLE 2
FUNCTIONAL ANALYSIS RATINGS FOR LITTLE ENCINAS CREEK

Function Evaluation Criteria	Rating: Little Encinas Creek	Rating: Adjacent Marsh Wetlands	Rating: Non-wetland Waters
Structural diversity	0.8	0.6	0.2
Spatial diversity	0.8	0.4	0.2
Habitat contiguity	0.2	0.2	0.2
Invasive vegetation	0.8	0.8	0.8
Hydrologic regime	1.0	1.0	1.0
Flood-prone area	1.0	1.0	0.7
Topographic complexity	0.6	0.2	0.6
Biogeochemical processes	0.8	0.8	0.8

TABLE 3
FUNCTIONAL ANALYSIS RATINGS FOR AQUA HEDIONDA CREEK

Function Evaluation Criteria	Rating: Agua Hedionda Creek	Rating: Adjacent Non-wetland Waters
Structural diversity	0.8	0.2
Spatial diversity	0.8	0.2
Habitat contiguity	0.4	0.2
Invasive vegetation	0.8	0.4
Hydrologic regime	1.0	1.0
Flood-prone area	0.7	0.7
Topographic complexity	0.2	0.2
Biogeochemical processes	0.8	0.8

TABLE 4
FUNCTIONAL ANALYSIS RATINGS FOR JURISDICTIONAL WATERS IN
PHASE II MASTER PLAN AREA

Function Evaluation Criteria	Rating: Wetlands	Rating: Adjacent Non-wetland Waters
Structural diversity	0.6	0.2
Spatial diversity	0.6	0.2
Habitat contiguity	0.4	0.2
Invasive vegetation	0.8	0.4
Hydrologic regime	1.0	1.0
Flood-prone area	0.7	0.7
Topographic complexity	0.2	0.2
Biogeochemical processes	0.8	0.8

Calavera Creek has stands of sycamore and willow trees with some mule fat shrubs in the understory or as monotypic stands in openings of the tree canopy (Photographs 1 and 2). The herbaceous layer of the understory is not well developed due to the dense tree canopy, the narrow habitat, and adjacent agricultural activities. Small wetland areas on tributaries to the creek lack a well developed tree layer and are comprised on mostly shrubs or herbaceous species (Photograph 3). Non-wetland waters draining into the creek are either vegetated with upland shrubs, non-native grasses, or cross cultivated fields (Photographs 4 and 5).

Agua Hedionda Creek has stands of riparian forest comprised of sycamores, oaks, and willows at the proposed crossing of College Boulevard (Photograph 6). Mule fat shrubs are found scattered in the understory, but the herbaceous layer is not well developed. The non-wetland waters that are tributary to this creek are vegetated with primarily non-native grasses.

Little Encina Creek has a well developed tree canopy of oaks and willow over portions of the project site (Photograph 7). Mule fat shrubs can be found scattered in the understory, but the dense tree canopy and the narrow creek restrict the development of a significant herbaceous layer. Small wetland patches adjacent to the creek consist of freshwater or seasonal alkali marsh, which lack a tree and shrub layer but have a dense cover of herbaceous vegetation. The non-wetland waters tributary to the creek are mostly vegetated with upland shrubs and non-native grasses.

Wetland areas within the master plan area of the project are composed of primarily riparian scrub vegetation. Shrubs such as mule fat dominate the habitat with scattered willow trees present in small numbers. The understory is poorly developed on most of the drainage courses due to the narrow channels and dense vegetation cover.

2. Spatial Diversity

Spatial diversity ranks are dependent on the amount of native riparian vegetation cover and on the number of different native riparian species contributing to this cover. Areas with relatively high cover of native riparian species comprised of at least three genera are given the highest rank.

Spatial diversity ranks for the three major creeks are similar due to the presence of riparian woodland or forest habitat. Native riparian species such as sycamore, oak, willow, and mule fat are present along portions of these creeks. Spatial diversity ranks for wetlands adjacent to these creeks is much lower due to a lack of species diversity. Non-wetland waters in the project area are primarily vegetated with upland plant species and therefore have low spatial diversity with respect to wetlands.

3. Contiguity

Habitat contiguity ranks are dependent on whether the drainage feature or wetland connects to similar habitats upstream and downstream, and the land uses adjacent to the drainage are undisturbed. High ranks go to drainage features that connect to similar habitats both up- and downstream and are surrounded by undisturbed upland habitats at least 100 feet wide.

Both Agua Hedionda and Calavera Creeks have similar riparian habitats upstream of the project area, but are isolated from direct habitat connections downstream by the Rancho Carlsbad Mobile Home Park development. Both creek channels within the mobile home park are surrounded by development and they are narrow and devoid of any native riparian vegetation. Little Encina Creek is isolated to the northeast by development in the city of Oceanside and to the southwest by the Rancho Carlsbad Mobile Home Park.

4. Invasive Species

This habitat characteristic is ranked by the amount of vegetative cover contributed by non-native invasive plant species. Areas with less than 5 percent cover of invasive species is given the highest rank.

The three major creeks contain some invasive plant species, but due to the narrow channels and dense native riparian vegetation these creeks have less than 10 percent cover of non-native plants. Only the tributary drainage courses adjacent to Little Encina Creek have less than 10 percent cover of invasive species, the other two creeks have tributaries that have been disturbed due to agriculture and therefore these contain higher cover values for non-native species.

Drainage courses within the Master Plan area, in general, have low cover of invasive species. The dense upland vegetation and isolated riparian areas along these drainage courses are relatively undisturbed helping to resist the invasion of this area by non-native species.

5. Other Biological Habitat Values

The wetland and non-wetland waters in the project area provide other biological values such as wildlife corridors within the project area, as well as to areas adjacent to the property off-site. The native riparian vegetation cover offers nesting opportunities for birds and cover for other animals. Seasonal flows provide a water source for wildlife.

B. Floodplain Characteristics

Three floodplain characteristics are considered when evaluating the functions and values of wetlands. These are hydrologic regime, characteristics of the flood-prone area, and topographic complexity of the floodplain.

1. Hydrologic Regime

The source of the water supply to the wetland area determines the rank for hydrologic regime. Natural streams, rivers, and creeks with natural sources of water rank the highest.

All of the major creeks and their non-wetland tributaries in the project area are primarily dependent on natural sources of water. Calavera Creek is the only drainage on the project that has a dam. The dam is located upstream of the project area and forms Calavera Lake. Some urban storm runoff and dry season runoff are contributed to these drainages from adjacent developed areas. Runoff from agricultural activities also contributes supplemental water to some of these drainage courses. Small seasonal alkali and freshwater marshes have high or perched groundwater levels that help support these wetland types.

2. Characteristics of the Flood-prone Area

Two characteristics of the flood-prone area of a wetland are considered in the determination of rank for this criteria. These are channel confinement and overbank flow. Natural channels with little or no evidence of incision or confinement that exhibit overbank flows are given the highest rank.

The three major creeks in the project area are earthen channels that are mildly incised or confined such that overbank flow is experienced mostly after a 10-year or greater flood event. Calavera and Agua Hedionda Creeks are confined due to development of the floodplains by ranches, agricultural activities, and urban improvements (e.g., roads, homes, commercial areas). Little Encina Creek is confined due to natural topography. The non-wetland waters have drainage courses that are confined by either topography or disturbance (i.e., agriculture).

3. Topographic Complexity

This feature is ranked by the presence of certain topographical characteristics of the floodplain. These characteristics include the presence of pits, ponds, hummocks, bars, rills, and large boulders. Floodplains that contain most of these features are given the highest ranks.

Topographic complexity of Calavera and Agua Hedionda Creeks in the project area is low due to the disturbance of the adjacent floodplains by agricultural or development activities which make the floodplain relatively flat and featureless. Little Encina Creek has a narrow floodplain due to topographic confinement, but has greater topographic complexity because the floodplain has fewer disturbances. Water courses within the master plan area also have confined floodplains that are relatively undisturbed.

C. Biogeochemical Processes

The relative amount of cover of vegetation and leaf litter, debris, or detritus determine the degree of roughness and organic carbon available to support natural biogeochemical processes (i.e., the break down of organic and inorganic material into nutrients). Roughness created by vegetation dissipates energy and slows flows. Organic matter found in leaf litter, debris, and detritus provides a source of nutrients both on the site and for transport to sites downstream. Wetland sites that contain greater than 20 percent relative cover of vegetation and greater than 60 percent relative cover of debris, leaf litter, or detritus are given the highest rank for this function.

The wetlands and non-wetland waters within the project area all have substantial cover of vegetation, but the litter layer varies between and within drainage courses. Overall, most drainage courses on the site have ample vegetation and litter cover to support natural biogeochemical processes.

Water Quality and Beneficial Uses

Jurisdictional wetlands and non-wetland waters on the project site provide a significant contribution to local or regional water quality in terms of groundwater recharge, nutrient removal, flood flow reduction, and sediment stabilization. The functions not only help maintain the water quality on-site, but also help maintain the water quality in downstream receiving waters (e.g., Agua Hedionda Lagoon).

Calavera and Little Encina Creeks are likely to have similar beneficial uses to those designated for Agua Hedionda Creek. These beneficial uses include municipal and domestic water supply; agricultural supply; industrial service supply; contact and non-contact water recreation use; warm freshwater habitat; and wildlife habitat. These beneficial uses will not be significantly affected by the proposed project because the creeks will largely be preserved as natural open space and measures incorporated into the project will minimize post-project changes to water quality.

Wetland Functions of Habitat to Be Restored/Created

The anticipated wetland functions of the created willow/scrub determine the achievement of compensation for impacts. Wetland hydrology and hydric soils conditions at the mitigation areas will be maintained in the long term by seasonal rainfall, groundwater, and project design features that will shunt water from developed areas to the mitigation sites. Functional wetlands will evolve over time that will provide water quality benefits to downstream receiving waters such as enhancement of groundwater recharge, wildlife habitat, enhancement of the wildlife corridors along these creeks, and provide native habitat for nature study.

A. Habitat Characteristics

The existing structural diversity of the proposed on-site mitigation areas are low and comprised of mostly exotic species of annual grasses and herbs with a few scattered shrubs (see Photograph 1). No riparian vegetation exists on the proposed on-site mitigation areas. After implementation of the mitigation, the structural diversity of the on-site mitigation areas would improve greatly as the native riparian species become established. Exotic species would decrease significantly. The resultant habitat in the mitigation area would then become contiguous with similar habitats adjacent to the mitigation sites both upstream and downstream.

B. Floodplain Characteristics

The areas adjacent to the proposed on-site mitigation area are not prone to flood often due to the confinement of the water to the channel in Calavera and Little Encina. Overbank flows to the proposed mitigation area likely occur only during relatively large flood events. After implementation of the on-site mitigation the frequency of overbank flows reaching the mitigation areas will increase by allowing smaller flood events to cause overbank flow to these sites. This will be accomplished by lowering the elevation of the mitigation sites to at least the elevation of the existing channel bottom.

Water at the proposed on-site mitigation areas will be provided by natural sources (i.e., seasonal rainfall, groundwater). After project development and the establishment of native riparian habitat at the mitigation sites urban runoff would also be expected to contribute to the hydrology of these areas.

C. Biogeochemical Processes

The roughness and organic carbon sources on the proposed on-site mitigation area are from exotic upland species. Once the riparian vegetation of the mitigation effort is established on the mitigation sites, roughness and organic carbon sources would be provided by native vegetation. Natural biogeochemical processes will be low at first, but increase rapidly as vegetation and litter layers develop.

D. Evaluation of the Mitigation Areas

The wetland functions and values of the mitigation sites will be monitored as the sites develop during the five-year monitoring period. Interim goals, as well as, ultimate goals for the development of wetland functions will be evaluated according to the criteria contained in Function-Based Performance Standards for Evaluation the Success of Riparian and Depressional/Emergent Marsh Mitigation Sites prepared for the U.S. Army Corps of Engineers (Stein 1999b). A full discussion of the criteria for evaluation of the mitigation areas is contained in the habitat restoration plan for the project (RECON 2001).

References Cited

RECON

- 2001 Habitat Restoration and Monitoring Plan for the City of Carlsbad Bridge & Thoroughfare District No. 4, the Calavera Hills Project, and the Detention Basins Project in Carlsbad, California. Prepared for Planning Systems. October.

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- 1999a Function-Based Method for Assigning Mitigation Ratios for Impacts to Riparian Systems. Prepared for the U.S. Army Corps of Engineers Los Angeles District - Regulatory Branch. December.
- 1999b Function Based Performance Standards for Evaluating the Success of Riparian and Depressional/Emergent Marsh Mitigation Sites. Prepared for the U.S. Army Corps of Engineers Los Angeles District - Regulatory Branch. December.